



Toji
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16th International Symposium on Solid Oxide Fuel Cells

SOFC—XVI

September 8–13, 2019

Kyoto, Japan

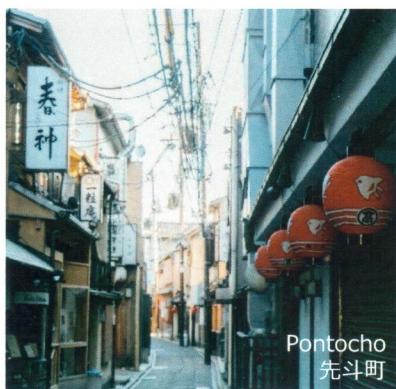
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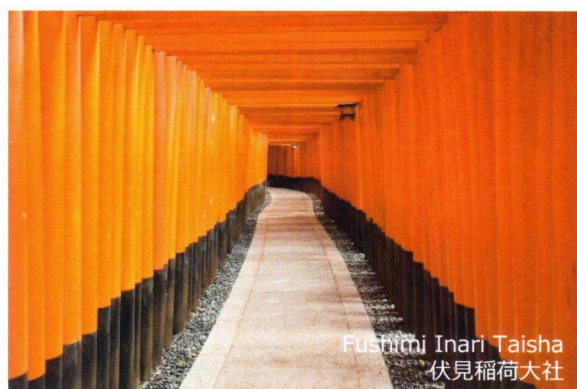
Sagano
嵯峨野



Tofukuji
東福寺



Pontocho
先斗町



Fushimi Inari Taisha
伏見稲荷大社

Wednesday, September 11, 2019

Room A

Solid Oxide Electrolysis and Reversible Cells and Systems I

Co-Chairs: Anke Hagen and Tatsumi Ishihara

- 9:00 OA33 **Co-Electrolysis of Biohythane Using Solid Oxide Fuel Cell Technology**
K. Panagi, C. J. Laycock, J. P. Reed, and A. J. Guwy (University of South Wales)
- 9:20 OA34 **A Simple Approach to Enhance the Direct Production of Methane through Co-Electrolysis of CO₂ and H₂O**
M. Lo Faro Sr., S. C. Zignani, S. Trocino, and A. S. Aricò (CNR-ITAE Institute)
- 9:40 OA35 **Preparation and Performance of Sr-Co Free Perovskite-Type Oxide La_{0.6}Ca_{0.4}Fe_{0.8}Ni_{0.2}O_{3-δ} as an Oxygen Electrode for Reversible Solid Oxide Electrochemical Cell**
Y. Tian, Y. Liu, W. Wang, L. Jia, B. Chi, J. Pu, and J. Li (Huazhong University of Science and Technology)
- 10:00 OA36 **Transition Metal Elements as Ni/GDC Dopants for the H₂O Electrolysis Process in SOECs: Fe-Ni vs Au-Mo-Ni Interaction**
C. Neofytidis, E. Ioannidou (FORTH/ICE-HT, University of Patras), S. G. Neophytides, and D. K. Niakolas (FORTH/ICE-HT)
- 10:20 Break
- 10:40 OA37 **Influence of A-Site Deficiency, Porous Electrolyte Scaffold and Loading of MIEC Material on the Performance of La_{0.8}Sr_{0.2}Cr_{0.5}Mn_{0.5}O_{3-δ} Based R-SOC Fuel Electrode**
M. Maide, P. Möller, G. Nurk, and E. Lust (University of Tartu)
- 11:00 OA38 **Further Improvement of Performances and Durability of Oxygen and Hydrogen Electrodes for Reversible Solid Oxide Cells**
H. Uchida, H. Nishino, K. Kakinuma, and M. E. Brito (University of Yamanashi)
- 11:20 OA39 **Oxygen-Deficient Nd_{0.8}Sr_{1.2}Ni_{0.8}M_{0.2}O_{4-δ} (M = Ni, Co, Fe) Nickelates as Oxygen Electrode Materials for SOFC/SOEC**
B. I. Arias-Serrano (University of Aveiro), E. Kravchenko (Belarusian State University), K. Zakharchuk (University of Aveiro), J. Grins, G. Svensson (Stockholm University), V. Pankov (Belarusian State University), and A. Yaremchenko (University of Aveiro)
- 11:40 OA40 **Perovskite-like LaNiO_{3-δ} as Oxygen Electrode Material for Solid Oxide Electrolysis Cells**
A. Yaremchenko, B. I. Arias-Serrano, K. Zakharchuk, and J. R. Frade (University of Aveiro)

Perovskite-Like $\text{LaNiO}_{3-\delta}$ as Oxygen Electrode Material for Solid Oxide Electrolysis Cells

A.A. Yaremchenko, B.I. Arias-Serrano, K. Zakharchuk, J.R. Frade

CICECO – Aveiro Institute of Materials, Department of Materials and Ceramic Engineering, University of Aveiro, 3810-193 Aveiro, Portugal

Perovskite-like $\text{LaNiO}_{3-\delta}$ was evaluated as potential oxygen electrode material for solid oxide electrolysis cells. Compared to the Ruddlesden-Popper $\text{La}_{n+1}\text{Ni}_n\text{O}_{3n+1}$ ($n = 1, 2, 3$) counterparts, $\text{LaNiO}_{3-\delta}$ exhibits higher p -type metallic-like conductivity under oxidizing conditions ($450 \text{ S}\times\text{cm}^{-1}$ at 800°C for highly porous ceramics) together with a moderate thermal expansion coefficient ($13.7 \text{ ppm}\times\text{K}^{-1}$ in air at $25\text{-}800^\circ\text{C}$) compatible with common solid electrolytes. The measured electrode polarization resistance (R_η) in contact with YSZ, CGO and LSGM solid electrolytes was 1.4 , 0.77 and $0.22 \text{ }\Omega\times\text{cm}^2$ at 800°C , and 208 , 123 and $7.1 \text{ }\Omega\times\text{cm}^2$ at 600°C , respectively, under zero-current conditions in air. Surface modification of via PrO_x infiltration resulted in lower values of R_η ($0.024 \text{ }\Omega\times\text{cm}^2$ at 800°C and $0.76 \text{ }\Omega\times\text{cm}^2$ at 600°C) and low anodic overpotentials (20 mV at 800°C and $500 \text{ mA}\times\text{cm}^{-2}$) in contact with LSGM.